

PSYCHE.

NOTES ON CERTAIN CYNIPIDAE WITH DESCRIPTIONS OF NEW SPECIES.

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[Reprint, with additions, of "A study of the cynipidae" (Rept. Mich. board agric., 1888, p. 446- . Separate, 15 p.)]

I wish to acknowledge my especial obligations to Mr. H. F. Bassett and to Mr. W. H. Ashmead for the determining of many species and for the large number of typical and other specimens that they kindly sent me and which have been a great help in preparing this paper. I am also under many obligations to Dr. C. V. Riley and Mr. L. O. Howard for the determination of galls and parasites; and to Professor A. J. Cook for the opportunities and material put at my disposal in the early part of my study.

OBSERVATIONS ON DESCRIBED SPECIES.

Diastrophus radicum Bass. My galls belonging to this species were received from a fruit-grower near Lansing, Michigan, in May, 1887, and a fine lot of cynips were reared from them. The galls were taken from small roots of the raspberry and appeared as irregular knotty swellings from one-half to three-fourths of an inch in diameter. These galls, which grew beneath the surface

of the ground, seem to have been better protected from the attacks of parasites and guest-flies, as only true cynips were reared.

I have never heard of the galls occurring in sufficient numbers to do serious damage. In the College garden several hundred raspberry bushes were transplanted and their roots examined for the galls but none were found.

Amphibolips coccinea O. S. So far as I can find, this species has always been reported as producing galls on *Quercus coccinea*. The only tree on which I have taken the galls is a small scrub oak, which, I was informed by a botanist, was probably *Q. nigrum*, but, as there was no fruit on the tree, the species could not be ascertained with certainty. On this tree there were not less than thirty or forty galls, the largest of which measured one and three-fourths inches in their greatest diameter by one and one-half inches in their least diameter. These galls differ from the

galls of *A. spongifica*, for which they are often mistaken, by occurring on *Q. coccinea* and *Q. nigrum* (?) instead of *Q. rubra*, by having a thinner outer shell, by having the surface more glossy and covered with small pimples, and by having the inner radiating substance matted about the central cell, from which it can easily be removed with the fingers, instead of having these fibers grown into a hard woody center surrounding the larval cell. The fly leaves the gall about the middle of June and its general color is a reddish brown. *A. spongifica* has two dates for appearing, a portion of the flies emerging in June and the remainder in October, and the general color of this species is black.

My specimens of *A. coccinea* began appearing June 16th. Neither guest nor parasites were reared.

Amphibolips spongifica O. S. (*Cynips confluentis* Harris, and *C. aciculata* O. S.) Walsh speaks of this species in the *American entomologist* as occurring plentifully on the black oak, *Q. nigrum*, but, although I have seen great numbers of these galls in both Michigan and Iowa on the leaves of *Q. rubra*, I have yet to find one on the leaves of *Q. nigrum*. The only flies that I have reared from these galls are those of the late part of the brood which began to appear October 3. On the 13th of October forty-seven galls were opened which gave seven true gall-flies, twenty-seven parasitised galls and the remainder blanks.

Amphibolips sculpta Bass. The beautiful translucent galls produced by

this species I have taken on the leaves of *Q. rubra* and *Q. coccinea*. They are attached to the under side of the leaves and may well be likened to large Delaware grapes in appearance. Galls taken in Michigan began giving flies June 21. Eight of these galls taken July 5 in the vicinity of Ames, Iowa, gave only parasites, two beautiful species of *Torymus*. No guests were reared.

Amphibolips inanis O. S. The gall of this fly is very common on the leaves of *Quercus rubra*. Large specimens are an inch in diameter. The galls are composed of a thin outer shell connected with the central larval cell by many thread-like radiating fibers. The flies begin to appear about the 20th of June. Over 90 per cent of the galls that I have collected have contained parasites. In the majority of cases, the central cell has been found to be crowded full of the parasitic larvae of what I take to be a species of *Tetrastichus*. There is also a large species of *Torymus* that I have found common in these galls.

Amphibolips prunus Walsh. A single specimen of what seems to be the gall of this species was taken from the cup of a black oak (*Q. nigrum*) about the middle of August. The gall was immature and no insect was reared from it.

Andricus clavula Bass. The red swollen tips of the twigs of *Quercus alba*, which are the galls of the above named gall-fly, are very common in Michigan and Iowa. From these galls I have reared several specimens of the guest, *Ceroptres petiolicola*, but no true gall-flies.

Andricus cornigera O. S. When Baron Osten Sacken described the gall of this fly he had never seen the cynip that produced it. His specimens were taken on the pin oak, *Q. palustris*. The galls in my collection supposed to belong to this species were all taken on the red oak and may prove to be a new species. I have taken a considerable number of these galls and they all differ from a beautiful type which I have from the pin oak by being very much darker in color and more irregular and rough in outline. The galls appear like knotty swellings completely surrounding the small limbs. From all sides of the gall little seed-like bodies, much the shape and size of a small barley corn, are pushed out. These contain the larvae of the gall-fly and fall to the ground some time in July, leaving the gall full of holes. I have a single imperfect fly taken from an immature gall.

Andricus futilis O. S. I have searched in vain for this gall in the vicinity of Lansing, but late in the fall of 1887 I found a small *Q. alba* in Ionia county, Michigan, standing in an open field, that had galls of this species on nearly every one of its dried leaves. The flies had made their escape so that no insects were reared.

Andricus punctatus Bass. Galls rare, but are occasionally found on small limbs of *Q. rubra*. They vary from one half of an inch to two inches in diameter and are smooth knotty swellings surrounding the limbs much the same as the galls of *A. cornigera*. From these galls I have reared the guests,

Ceroptres petiolicola, *Synergus lignicola* and an undetermined species; also the parasite *Decatoma varians*, but no true gall-flies.

Andricus seminator Harr. The brown, woolly galls, so common on the twigs of *Q. alba* in midsummer, are the product of this cynip. Galls gathered early in July gave flies the seventh of the same month. A green parasitic fly, a species of *Syntomaspis*, I have reared from these galls in fully as large numbers as the true gall-maker. No guests have been reared.

Andricus scitulus Bass. This species seems rare. I have taken a few of the galls on *Q. rubra* in the vicinity of Lansing, Mich., and near Ames, Iowa. In the latter case the galls were taken July 5, when the flies were found to be already escaping. A few specimens of two undetermined parasites were also reared. The galls are composed of a woody enlargement of the tips of the twigs.

Andricus flocci Walsh. (*Cynips lana* Fitch.) Walsh marks this species "rare." I took a number of the galls from the leaves of *Q. alba* and *Q. macrocarpa* in Michigan and find it to be one of the most common galls on both these oaks at Ames, Iowa. The galls appear as little bunches of brown wool growing out from the mid-rib, or one of the main-veins, on the under side of the leaves. Beneath the wool is a cluster of small seed-like bodies about as large as a very small kernel of wheat. Galls taken in Michigan late in the fall gave flies March 20. A few parasites, but no

guests were reared. The flies appeared in abundance.

Andricus singularis Bass. Galls very common on *Q. rubra* leaves. In shape and structure these galls resemble the gall of *A. inanis*, but are much smaller, large specimens seldom attaining one-half inch in diameter. The galls project on both sides of the leaves, the larger portion always being below. Galls taken June 18 gave flies June 20. No guests were reared and the galls were little parasitised. Parasites undetermined.

Andricus petiolicola Bass. Galls found common on *Q. alba*, *Q. macrocarpa* and *Q. bicolor*. The galls are formed by the enlargement of a portion of the petiole of the leaf, and after the leaves have fallen the galls stand out like little knotty projections. The galls that I have taken vary from 5-16 to 10-16 of an inch in diameter. Galls taken at Ames, July 3, gave flies July 5. *Ceroptres petiolicola* is a very common guest in this gall.

Cynips dimorphus Ash. ms. Mr. W. H. Ashmead, of the Florida Exp. Station, informs me that he has had this cynip and gall described in manuscript under the above name. Galls, red and globular, two to three mm. in diameter, and arranged in clusters of from 10 to 30 or more on the under side of the leaves of *Q. prinus*, *Q. macrocarpa* and *Q. bicolor* in September and October. Rather common. Galls taken in the fall contained larval cynips on the first of July following.

Cynips strobilana O. S. The gall

of this cynip I find quite rare. The galls are easiest found after the leaves have fallen. They have been taken from *Q. macrocarpa* and *Q. bicolor*. The individual galls are irregular, cone-shaped bodies, from fifteen to thirty of which constitute a cluster which always arises from a terminal bud. My largest cluster measures nearly two inches in diameter. Specimens taken last October still contain larvae (Sep. 20).

The guest, *Synergus lignicola*, has been reared from the galls in considerable numbers and also a few parasites belonging to the genus *Eurytoma*.

Acraspis erinacei Walsh. (*C. pisum* Fitch.) Galls common in September and October on the leaves of *Q. alba*, usually on the under side. When growing they are of a beautiful rose or straw color and are covered with short spines or hairs. The gall is exceedingly hard when dry and the surface is made up of little seed-like projections, much resembling the surface of a strawberry. The galls seldom contain less than two or more than five larval cells.

The mature insect emerges in November and is wingless, or, rather, with only stubs of wings.

A very common parasite reared from this gall is *Decatoma flava*.

Biorhiza forticornis Walsh. (*Cynips ficus* Fitch.) Galls occurring near the tips of the twigs of *Q. alba*, almost invariably on young second growth shoots. A hundred or more are often crowded together about the shoots and appear much like a great number of little compressed sacks. When green they are

light yellow in color, but are brown when dry. Common.

A few undetermined parasites only have been reared.

Holcaspis globulus Fitch. Galls globular, from three to six eighths of an inch in diameter, composed of a corky material with an egg-shaped central cell, always occurring on the twigs of *Q. alba*. The fly emerges late in October or early in November.

Decatoma varians, an undetermined species of the same genus, and a species of *Eurytoma* have been reared as parasites on this fly. Common.

Holcaspis rugosa Bass. The gall and the fly of this species resemble very closely those of *H. globulus*. I have found the galls to be more highly colored than those of the latter species, and when matured they have a shriveled surface, while *globulus* is smooth. These galls have been taken on *Q. prinus* only, and are scarce. One guest, *Synergus ficus*, and the parasites, *Decatoma varians*, *Decatoma* sp., *Eurytoma punctiventris* and *Syntomaspis* sp., have been reared from the galls of this species.

Holcaspis duricoria Bass. (*H. mamma* Walsh.) This is probably the gall-fly referred to by Walsh in a foot-note in the *American entomologist*, vol. 1, page 102, for which he suggests the specific name *mamma*. Mr. Bassett described this insect and gave it the specific name *duricoria*, a name that has been accepted by European entomologists. For this reason, and for the farther reason that Walsh's description is not sufficient

to distinguish the species with any certainty, I have given Bassett's name the preference.

The galls are very common on the twigs of *Quercus bicolor* and *Q. macrocarpa*. They may appear singly but are usually crowded together in clusters about the twigs. The galls, unless much crowded in the cluster, are sub-globular in outline with a small teat-like projection. The fly, which much resembles *H. globulus*, *H. rugosa* and *H. Bassetti*, began to appear in the breeding cages Oct. 27. Fig. 3 is a full size representation of a cluster of these galls.

Two parasites, *Decatoma varians* and *Ormyrus ventricosus* were reared from this species.

Dryophanta papula Bass. These galls have been taken on *Q. rubra* and *Q. coccinea*. They consist of thickened portions of the leaves that are raised in many sharp points on the upper side. These thickened portions are lighter in color than the surrounding parts of the leaf and each little point seems to mark the location of the larval cell. Flies began to appear July 12. Rare.

The great majority of insects reared from these galls have been parasites of the genus *Tetrastichus*.

Neuroterus noxiosus Bass. The galls are irregular swellings of the twigs of *Q. bicolor*. Galls taken in January gave the mature insects the last of March following. Galls not at all common.

The guests *Synergus lignicola* and an undetermined species of the same

genus were reared. A number of the parasite, *Ormyrus minutus*, were also reared.

Neuroterus vesicula Bass. When the larva of this species is full grown the gall is a thin shell, globular in form, almost black in color, covered with light spots, does not exceed three mm.

in diameter and is supported by the bud scales of *Q. bicolor* and *Q. macrocarpa*. Galls taken April 29 gave flies May 3.

Neither guests nor parasite were reared.

(To be continued.)

NOTES ON THE PARASITE OF THE SPOTTED LADY-BEETLE (*MEGILLA MACULATA*).¹

BY CLARENCE MOORES WEED AND CHARLES A. HART.

Our attention was first called to this subject during the summer of 1884 when dead examples of the common spotted lady-beetle (*Megilla maculata*) were found by Mr. Hart on various plants, each having beneath or beside it a compact brown cocoon, about 4 mm. long by 2 mm. wide. The matter was not especially studied at that time, and no further attention was paid to it until 17 July 1885, when several examples of the same kind were found in a corn-field. The lady-beetles were in two cases dead, while in three or four others

they were alive and embracing the cocoon with their legs. One of the cocoons attached to a dead beetle had a cap removed from one end, the parasite having doubtless escaped through the opening thus made. The other cocoons were placed in a breeding cage, and the imagoes were bred from them.

A living specimen of the same lady-beetle was again found 5 August 1885 on corn, at the base of a leaf, with a cocoon of its parasite entangled in its legs. It was retained alive for examination and acted much as a spider does about its egg-sack. When found, its hind claws were caught in the loose silk of the cocoon, but when the cocoon was removed the lady-beetle seemed greatly disturbed, and would fold its legs about anything within reach. It walked holding its body high in the air, and when it came in the vicinity of the cocoon, its claws would become entangled so that it dragged the cocoon along after it. When placed upon its back it waved its feet

¹ The present paper is mainly an abridgement of a more elaborate one prepared for the Cleveland (1888) meeting of the Entomological club of the American association for the advancement of science (the title of which was sent to the secretary) but as I was unable to reach Cleveland before the club adjourned it was not read. Since the meeting, however, an article covering the main grounds of our paper has been published in *Insect life* (Oct. 1888, v. 1, p. 101-104) by Dr. Riley, but it has been thought worth while to present these additional observations upon the presence and habits of the parasite and its host in Illinois, where all the observations here recorded were made, as a part of the work of the Illinois State laboratory of natural history.

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